

Curriculum vitae

Jon N. Seal
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Education

Florida State University	Organismal Biology	Ph.D. 2006
University of Missouri-St. Louis	Tropical Biology	M.S. 1999
University of Missouri-St. Louis	Biology	B.S. 1994
University of Missouri-St. Louis	German	B.A. 1994

Professional Experience

- Associate Professor, University of Texas at Tyler, 2019-present
- Assistant Professor, University of Texas at Tyler, 2013- 2019
- Research Associate, University of Texas at Austin, 2011-2013
- Postdoctoral Fellow, University of Texas at Austin, 2009-2011
- Wissenschaftlicher Mitarbeiter (Research Associate), University of Regensburg, 2007-2009
- Adjunct Professor, Santa Fe Community College, Gainesville, Florida, 2006-2007
- Graduate Teaching Assistant, Florida State University, 2000-2006

Current and Past Major Funding

2016-current National Science Foundation, Integrative Organismal Systems, Symbiosis, Infection and Immunity Program. *CAREER: Mechanisms of specificity and homeostasis in an obligate symbiosis (IOS-1552822) (\$722,399)* Role: PI

2014 - 2020 National Science Foundation, Division of Environmental Biology, Evolutionary Ecology, Collaborative Research: *Evolution of adaptive synergism between mutualistic partners during range-limit evolution. (DEB-1354629) (Total Award, \$417,837, UT Tyler share: \$ 81,171)* Role: Co-PI.

2014- present, Texas Ecolab/Texas Museum of Natural Science (\$58,954 awarded to date)
Biodiversity of ants and their symbionts of east and central Texas. Role: PI

2015-2018, **German Science Foundation** (Deutsche Forschungsgemeinschaft), The fecundity/longevity tradeoff in a clonal ant. Role: Senior Collaborator. <http://gepris.dfg.de/gepris/projekt/276397421>

2009-2012 National Science Foundation, Integrative Organismal Systems, Symbiosis Defense and Self-Recognition Program. *Physiological constraints of symbiont switching: An experimental study of cultivar fidelity and cultivar re-association in fungus-growing ants. (IOS-0920138) (\$398,590)* Role: Co-PI

Pending Funding

2022-2026. National Science Foundation, Division of Environmental Biology, Ecosystems Science. Collaborative Research: RUI: The influence of ants on regional-scale soil carbon dynamics (DEB-2031765) ((\$696,489) Role: PI

Invited Preproposals

2017. National Science Foundation, Division of Environmental Biology, Population and Community Ecology. *Collaborative Research: RUI: Awake, sleeping beauties! Soil microbial community regulation by ecosystem engineers*, (DEB-1732684). PI

2014. National Science Foundation, Integrative Organismal Systems, Symbiosis Defense and Self-Recognition Program. *Collapse and homeostasis in an obligate symbiosis: are microbes key to stability?* (IOS-1456863). PI

Declined Full Proposals

2020-2024. National Science Foundation, Division of Environmental Biology, Ecosystems Science. Collaborative Research: RUI: The influence of ants on regional-scale soil carbon dynamics (DEB-2031765) (E, 3x VG, 2xG) (\$631,438) Role: PI

2017. National Science Foundation, Division of Environmental Biology, Population and Community Ecology. *Collaborative Research: RUI: Awake, sleeping beauties! Soil microbial community regulation by ecosystem engineers* PI, (DEB-1754223). (\$495,573) PI

2015. National Science Foundation, Division of Biological Infrastructure , Major Research Instrumentation. MRI: Acquisition of a high performance computing cluster for bioinformatics at UT Tyler, (MRI-1531484) (\$200,000). Co-PI

2015. National Geographic Society. Phylogeography of fungus-gardening ants and their symbionts in the North American Coastal Plain: was migration to Texas associated with the exchange of fungal symbiont crops? PI(\$20,000)

2014. National Science Foundation, Integrative Organismal Systems, Symbiosis Defense and Self-Recognition Program. *Collapse and homeostasis in an obligate symbiosis: are microbes key to stability?* (IOS-1456863) PI. (\$300,000); Preproposal and Proposal Ranking: Medium Priority. PI

2011. National Science Foundation, Integrative Organismal Systems, Symbiosis Defense and Self-Recognition. Information management in an obligate symbiosis: an experimental study of ant-fungus and ant-ant communication in fungus-growing ants (IOS-1121755) (\$101,616) Proposal Ranking: Medium Priority. PI

Declined Preproposals

2016. NSF (DEB) Preliminary Proposal: Division of Environmental Biology, Population and Community Ecology, Preliminary Proposal: Collaborative Research: Biogenic structures of soil ecosystem engineers as drivers of biodiversity and belowground community assembly

2015. NSF (IOS) Preliminary Proposal. National Science Foundation, Integrative Organismal Systems, Symbiosis Defense and Self-Recognition Program *Collapse and homeostasis in an obligate symbiosis: are microbes key to stability?* PI. Preproposal: Medium Priority. Co-PIs Hertweck, Kellner

2015. NSF (DEB) Preliminary Proposal: National Science Foundation, Division of Environmental Biology, Population and Community Ecology, *RUI: Collaborative Research: A comparative study of the impacts of soil ecosystem engineers on soil microbiome and properties across an environmental gradient*. Lead PI (Collaborating proposal Joshua King, University of Central Florida)
2014. NSF (IOS) IOS Preliminary Proposal: National Science Foundation, Integrative Organismal Systems, Integrative Ecological Physiology Program: *Function and impact of the extended phenotype: changing traits and physiology of fungus gardening ants nests across the southern United States*.
2013. NSF (DEB) National Science Foundation, Division of Environmental Biology, Evolutionary Ecology, *Preliminary Proposal: Microbial Communities and disease transmission in a parthenogenic ant society* (Co-PI with K. Kellner)
2013. NSF (IOS) Integrative Organismal Systems, Symbiosis Defense and Self-Recognition Program. *Preliminary Proposal: Information Management in an obligate symbiosis: an experimental study of ant-fungus and ant-ant communication in fungus-growing ants*

Small Awards

- 2016 University of Texas at Tyler Research Award (Office of Sponsored Research)
- 2006 Theodore Roosevelt Memorial Fund, **American Museum of Natural History**
- 2006 Short Term Fellowship, **Smithsonian Tropical Research Institute**
- 2006 Nominee, Outstanding Teaching Assistant Award, **Florida State University**
- 2005 Dissertation Research Grant. **Florida State University** School of Graduate Studies.
- 2005 Horace Loftin Endowment Fellowship. **Florida State University**, Department of Biological Science

Peer-Reviewed Publications

* indicates student co-authors

1. Beigel*, K., Matthews*, A.E., Kellner, K., Pawlik*, C., Greenwold, M. & **Seal, J.N.** (Accepted) Cophylogenetic analyses of ant-fungal specificity: 'One to one with some exceptions'. **Molecular Ecology**, <https://doi.org/10.1111/mec.16140>
2. Matthews*, A. E., Kellner, K., & **Seal, J. N.** (2021). Male biased dispersal in a female-dispersed symbiosis. **Ecology and Evolution**. <https://doi.org/10.1002/ece3.7198>
3. Matthews* AE, Rowan* C, Stone* C, Kellner K, **Seal JN**. 2020. Development, characterization, and cross-amplification of polymorphic microsatellite markers for North American *Trachymyrmex* and *Mycetomoellerius* ants. **BMC Research Notes** **13**: 173.
4. Luiso* J, Kellner K, Matthews* AE, Mueller UG, **Seal JN**. 2020. High Diversity and Multiple Invasions to North America by fungi grown by the northern most *Trachymyrmex* and *Mycetomoellerius* ant species. **Fungal Ecology**, <https://doi.org/10.1016/j.funeco.2019.100878>.
5. Senula* SF, Scavetta* JT, Banta JA, Mueller UG, **Seal JN**, Kellner K. 2019. Potential Distribution of Six North American Higher-Attine Fungus-Farming Ant (Hymenoptera: Formicidae) Species. **Journal of Insect Science**, 19:1-11.
6. Smith, C.C., Weber, J.N., Mikheyev, A.S., Roces, F., Bollazzi, M., Kellner, K., **Seal, J.**, Mueller, U.G., 2019. Landscape genomics of an obligate mutualism: concordant and discordant population structures between the leafcutter-ant *Atta texana* and its two main fungal symbiont types. **Molecular Ecology** **28**, 2831-2845.
7. Kellner, K., M. R. Kardish, **J.N. Seal**, T. A. Linksvayer, and U. G. Mueller (2018). Symbiont-mediated host-parasite dynamics in a fungus-gardening ant. **Microbial Ecology** **76**(2): 530-543

8. DeMillo*, A. Rouquette, M., Kellner, K, Mueller, UG and **J.N. Seal**. (2017) Effects of Substrate, Ant and Fungal Species on Plant Fiber Degradation in a Fungus-gardening Ant Symbiosis. **Journal of Insect Physiology**. 98: 301-308
9. Tschinkel, W.R. and **J.N. Seal**. (2016). Bioturbation by the fungus-gardening ant, *Trachymyrmex septentrionalis*. **PLoS One** 11(7): e0158920
10. **Seal, J.N.**, Brown*, L., Ontiveros*, C., Thiebaud*, J. & Mueller, U.G. (2015). Gone to Texas: comparative phylogeography of two *Trachymyrmex* species along the southeastern coastal plain of North America. **Biological Journal of the Linnean Society** 114: 689-698
11. **Seal, J.N.**, Schiøtt, M. & Mueller, U.G. (2014) Ant-fungal species combinations engineer physiological activity of fungus gardens. **Journal of Experimental Biology** 217: 2540-2547.
12. Shik, J.Z., Santos, J.C., **Seal, J.N.**, Kay, A., Mueller, U.G. & Kaspari, M. (2014) Metabolism and the rise of fungus cultivation by ants. **The American Naturalist** 184: 364-373.
13. **Seal, J.N.** & Mueller, U.G. (2014) Instability of novel ant-fungal associations suggest that microbial interactions constrain horizontal transfer in higher fungus-gardening ants. **Evolutionary Ecology**, 28: 157-176.
14. Kellner, K., **Seal, J.** & Heinze, J. (2013) Sex at the margins: geographic parthenogenesis in the ant *Platythyrea punctata*. **Journal of Evolutionary Biology**, 26: 108-117.
15. **Seal, J.N.**, Gus*, J. & Mueller, U.G. (2012) Fungus-gardening ants prefer native fungal species: Do ants control their crops? **Behavioral Ecology**, 23: 1250-1256.
16. **Seal, J.N.**, Kellner, K., Trindl, A. & Heinze, J. (2011) Phylogeography of the parthenogenic ant, *Platythyrea punctata*: highly successful colonization of the West Indies by a poor disperser. **Journal of Biogeography** 38: 868-882
17. **Seal, J.N.** & Tschinkel, W.R. (2010) Distribution of the Fungus-Gardening Ant, *Trachymyrmex septentrionalis* during and after a record drought. **Insect Conservation and Diversity** 3: 134-142
18. **Seal, J.N.** (2009) Scaling of body weight and fat content in fungus-gardening ant queens: does this explain why leaf-cutting ants found claustrally? **Insectes Sociaux**, 56 : 135-141.
19. **Seal J.N.** and Tschinkel W.R. (2008) Food limitation in the fungus-gardening ant, *Trachymyrmex septentrionalis*. **Ecological Entomology** 33:597-607
20. **Seal JN**, Tschinkel WR (2007a) Energetics of newly mated queens and colony founding in the fungus-gardening ants *Cyphomyrmex rimosus* and *Trachymyrmex septentrionalis* (Hymenoptera: Formicidae). **Physiological Entomology** 32:8-15
21. **Seal JN**, Tschinkel WR (2007b) Complexity in an obligate mutualism: Do fungus-gardening ants know what makes their garden grow? **Behavioral Ecology and Sociobiology** 61:1151-1160
22. **Seal JN**, Tschinkel WR (2007c) Co-evolution and the superorganism: switching cultivars does not alter the performance of fungus-gardening ant colonies. **Functional Ecology** 21:988-997
23. **Seal JN**, Tschinkel WR (2006) Colony productivity of the fungus-gardening ant, *Trachymyrmex septentrionalis* McCook, in a Florida pine forest (Hymenoptera: Formicidae). **Annals of the Entomological Society of America** 99:673-682
24. **Seal JN**, Hunt JH (2004) Food supplementation affects colony-level life history traits in the annual social wasp *Polistes metricus* (Hymenoptera, Vespidae). **Insectes Sociaux** 51:239-242
25. **Seal JN** (2002) Does *Polistes instabilis* de Saussure (Hymenoptera: Vespidae) investment predict nest defense? **Journal of the Kansas Entomological Society** 75:335-338

Peer-Reviewed Letters, Chapters and Reviews

26. Heinze, J., Kellner, K. & **Seal, J.N.** (2017) Sociality in Ants. *Comparative Social Evolution* (ed. by P. Abbot and D. Rubenstein). Cambridge University Press.

27. **Seal, J.N.** & Mueller, U.G. (2014) Instability of novel ant-fungal associations suggest that microbial interactions constrain horizontal transfer in higher fungus-gardening ants. (ed. by H. Wu and E. Standridge, Pp. 249-276 In *Reading and Writing about the Disciplines: a Rhetorical Approach.*) Fountainhead Press. Southlake, Texas.
28. **Seal, J.N.** & Tschinkel, W.R. (2012). The under-appreciated non-leaf cutting Attini: A Response to Leal et al. (2011). **Annals of the Entomological Society of America** 105:1-2
29. **Seal, J.N.** (2008) The Superorganism: the beauty, elegance and strangeness of insect societies (Book Review). **Myrmecological News**, 12, 22.

Manuscripts in Preparation

1. **Seal, J.**, K. Kellner, and U. Mueller (in revision) Ants control their crops: an experimental analysis of specificity and stability in an obligate symbiosis.
2. Allert, M*, Kellner, K., Hertweck, K., **Seal, J.**, (in prep) Comparative microbiome analysis of two sympatric fungus-gardening ants
3. Fiesel*, P., **Seal, J.N.**, Kellner, K., & Heinze, J. (in prep) Limited gene flow in a parthenogenic ant in the Mesoamerican Biological Corridor
4. Seal, J.N. The mechanisms of Attini-fungi interaction. Invited Review, *Myrmecological News*

Theses Mentored

1. DeMILTO, Alexandria. Lignocellulose metabolism in two species of *Trachymyrmex* fungus-gardening ants. 2013-2015.
2. Allert, Mattea. Microbial Communities Associated with Two Sympatric Species of *Trachymyrmex* fungus-gardening ants: Environmental and Heritable Components of the Symbiosis. 2015-2017.
3. Katherine Beigel. Patterns of host-symbiont specificity among co-occurring fungus-gardening ants and their fungal cultivars. 2018- 2020.
4. Blake Bringham. Impact of symbiont switching on host and symbiont bacterial microbiomes. 2019-present

Courses (Instructor of Record)

Biology for Majors (lecture and lab, Organisms to the Environment)
 Evolution (lecture)
 Ecology (lecture and lab)
 Entomology (lecture and lab)
 Animal Behavior (Graduate Level)
 Symbiosis (Graduate Level)

Invited Seminars/Symposia

2017 Department of Biological Sciences, Clemson University
 2016 Department of Entomology, Texas A&M University
 2016 Department of Biological Sciences, University of Arkansas
 2015 Department of Biology, University of South Alabama
 2014 Department of Biology, University of Central Florida
 2014 Department of Biological Sciences, University of Texas at El Paso
 2012 Section of Integrative Biology, University of Texas at Austin

- 2011 Department of Biology, University of Texas at Tyler
- 2011 Department of Biology, University of Texas-Pan American, Edinburg, Texas
- 2009 Center for Social Evolution, University of Copenhagen, Copenhagen, Denmark
- 2008 Department of Behavioral Physiology, University of Würzburg, Würzburg, Germany
- 2008 International Congress of Entomology, Durban South Africa. Symposium: Breeding Systems in Social Insects
- 2007 Zoological Institute, University of Regensburg, Regensburg, Germany
- 2005 USDA Center for Medical and Veterinary Entomology, Gainesville, Florida

Conference Proceedings

- 2019 Entomological Society of America, Annual Meeting, St. Louis, Missouri
- 2018 Entomological Society of America, Annual Meeting, Vancouver, British Columbia
- 2016 International Congress of Entomology, Orlando, Florida
- 2016 European Meeting of the International Union for the Study of Social Insects, Helsinki, Finland
- 2015 Entomological Society of America, Annual Meeting, Minneapolis, Minnesota
- 2015 International Symbiosis Society Congress, Lisbon, Portugal
- 2015 Big Thicket Association, West Gulf Coastal Plain Conference, Nacogdoches, Texas
- 2014 Society for Ecological Restoration, Annual Meeting, Alpine, Texas
- 2014 Society for the Study of Evolution, Annual Meeting, Raleigh, North Carolina
- 2013 Entomological Society of America, Annual Meeting, Austin, Texas
- 2012 North American section, IUSSI, Greensboro, North Carolina.
- 2011 Entomological Society of America, Annual Meeting, Reno, Nevada
- 2010 International Union for the Study of Social Insects, 16th International Congress, Copenhagen, Denmark.
- 2009 Central European Section Meeting of the International Union for the Study of Social Insects, Fraueninsel, Germany
- 2009 Deutsche Zoologische Gesellschaft (German Zoological Society), Regensburg, Germany
- 2009 Ethologische Gesellschaft (Ethological Society), Göttingen, Germany
- 2008 International Congress of Entomology, Durban South Africa.
- 2008 North American meeting of the International Union for the Study of Social Insects, Arecibo, Puerto Rico
- 2008 European Meeting of the International Union for the Study of Social Insects, La Roche en Ardennes, Belgium
- 2008 Ethologische Gesellschaft (Ethological Society), Regensburg, Germany
- 2006 International Congress of the International Union for the Study of Social Insects, Washington, D.C.
- 2005 Entomological Society of America, Annual Meeting, Ft. Lauderdale, Florida.
- 2004 North American section, IUSSI, Tonto National Forest, Arizona.
- 2002 Entomological Society of America, Annual Meeting, Ft. Lauderdale, Florida.

Outreach/Service

Subject Editor, *Insects*

University Committees: University Research Council (2014-2017), Director of Research and Scholarship Search Committee (2017), UT Tyler Graduate Council (2020-present)

Departmental Committees: Faculty Evaluation Committee (2014-2015), Faculty Search/Bioinformatics (2013-2014), Biology Seminar Committee (2013-2014; **Chair** 2015-2016), Graduate Affairs Committee (**chair**, 2016-2017), Graduate Student Thesis Committees, Chair of Biology search committee (2018)

Exhibitor: Darwin Day, University of Texas at Tyler, 2015-2018. Hispanic Engineering, Science, and Technology Week. NSF Exhibit. University of Texas-Pan American. (September 2011), Hot Science – Cool Talks Outreach Series. University of Texas at Austin (October 2010).

Mentor. University of Texas System Louis Stokes Alliance for Minority Participation (LSAMP) 2014-2015, Participant in the NSF Summer Science Institute at Jarvis Christian College. June 2013

Society Memberships

American Institute of Biological Sciences (2003-)

Entomological Society of America (1996-)

International Union for the Study of Social Insects (2004-)

International Symbiosis Society (2013-)

Reviewer

Journals: Animal Behavior, Behavior, Behavioral Ecology and Sociobiology, Biological Journal of the Linnean Society, Environmental Microbiology and Environmental Microbiology Reports, Ethology, Functional Ecology, Frontiers in Zoology, Insect Conservation and Diversity, Insectes Sociaux, Journal of Animal Ecology, Journal of Ethology, Journal of Insect Physiology, Molecular Phylogenetics and Evolution, Myrmecological News, Pest Management Science, Naturwissenschaften, Revista Brasileira de Entomologia, Zoology

Grants: Panel Service: National Science Foundation (USA) Division of Environmental Biology (DEB) and Integrative Organismal Systems (IOS). Ad Hoc Reviewer: National Science Foundation (USA), Agence Nationale de la Recherche (France)

Languages

English (native)

German (near fluency)

Spanish (beginner)

Field Experience

International: Barbados, Grenada, Dominica, Bahamas (Grand Bahama and New Providence), Puerto Rico, Jamaica, Mexico, Nicaragua, Honduras, Belize, Costa Rica, Panama, Guyana and Germany.

US: Florida (keys, north and central Florida), Texas (south, central, east and west), Arizona, New Mexico, Missouri, and Illinois